ENGINEERING EXPERIMENT STATION
of the Georgia Institute of Technology
Atlanta, Georgia

STATUS REPORT NO. 34

PROJECT NO. 116 -18

INVESTIGATION OF FUNDAMENTAL PROPERTIES OF ELEMENTS AND THEIR COMPOUNDS INCLUDING THE RARE EARTHS AT VERY LOW TEMPERATURES WITH PARTICULAR EMPHASIS UPON SUPERCONDUCTIVITY

By

W. T. Ziegler

- o - o - o - o -

NAVY DEPARTMENT, OFFICE OF NAVAL RESEARCH
CONTRACT NO. N6-ori-192, TASK ORDER I
NR 016-406

- o - o - o - o -

May 1, 1954 to August 1, 1954

ENGINEERING EXPERIMENT STATION
of the Georgia Institute of Technology
Atlanta, Georgia

STATUS REPORT NO. 34

PROJECT NO. 116 -18

INVESTIGATION OF FUNDAMENTAL PROPERTIES OF ELEMENTS AND THEIR COMPOUNDS INCLUDING THE RARE EARTHS AT VERY LOW TEMPERATURES WITH PARTICULAR EMPHASIS UPON SUPERCONDUCTIVITY

By

W. T. Ziegler

- o - o - o - o -

NAVY DEPARTMENT, OFFICE OF NAVAL RESEARCH
CONTRACT NO. N6-ori-192, TASK ORDER I
NR 016-406

- o - o - o - o -

May 1, 1954 to August 1, 1954

TABLE OF CONTENTS

This Report Contains 3 Pages

I. SUMMARY

The repair of the hydrogen liquefier, damaged in an explosion, has been completed.

A second purifier has been constructed thus doubling the capacity to purify the high-pressure hydrogen entering the liquefier.

Analysis of the calibration data obtained for three platinum resistance thermometers over the range 10° to 320° K. has been continued.

It is expected that measurements of the heat capacity of La_2O_3 over the range 15° to 320° K. can be started during the next three months.

II. LOW-TEMPERATURE RESEARCH

The immediate objective of the present research is the determination of the heat capacities of several rare earth oxides (notably La_2O_3, Nd_2O_3 and Pr_2O_3) over the temperature range 15° to 320° K. This objective has required the construction of an adiabatic calorimeter for the heat-capacity measure - ments and a cryostat for calibrating several platinum resistance thermometers against a standard thermometer calibrated at the National Bureau of Standards.

The adiabatic calorimeter is complete except for the final assembly of the gold-plated calorimeter can. Measurements with the calorimeter have awaited the completion of the calibration of a platinum thermometer for use with the calorimeter.

The repairs of the hydrogen liquefier, damaged by an explosion (see Status Report No. 33 dated February 1 to May 1, 1954), have been completed. The liquefier has not yet been tested.

The explosion referred to above was an indirect result of impurities in the high-pressure hydrogen gas commercially available to us. (The liquefier operates directly from compressed hydrogen in cylinders.) Another purifier, identical with one already in use (ONR contract No. N6-ori-192, Progress Report No. 5, August 1, 1947), has been constructed to purify the hydrogen before it enters the liquefier. This will double the capacity of the purification system.

Analysis of the data obtained for the calibration of three platinum resistance thermometers over the range 10° to 320° K. has continued.

III. FUTURE WORK

It is expected that during the next three months' evaluation of the results of the calibration experiments on the platinum thermometers, together with the preparation of resistance-versus-temperature relations, will be completed. It is believed that measurements of the specific heat of lanthanum oxide, La_2O_3, over the range 15° to 320° K can be started.

IV. MEETINGS AND CONFERENCES

Dr. Ziegler plans to attend the National Conference on Cryogenic Engineering to be held at Boulder, Colorado, September 8 - 10, and the Ninth Calorimetry Conference to be held at Schenectady, N. Y., September 17 and 18, 1954. The expenses of these trips will be borne in part by the present project and in part by the Georgia Institute of Technology.

V. PERSONNEL

The following individuals have been associated with the project during the period covered by this report:

Name	Position	Time
Dr. W. T. Ziegler	Director	Part time*
Mr. H. A. McGee, Jr.	Graduate Assistant	Part time**
Mr. W. M. Ligon	Graduate Assistant	Part time
Mr. R. G. Wooten	Graduate Assistant	Part time***
Mr. W. D. Bradbury, Jr.	Graduate Assistant	Part time

Respectfully submitted:

W. T. Ziegler

W. T. Ziegler
Project Director

Approved:

Paul K. Calaway

Paul K. Calaway, Acting Director
Engineering Experiment Station

---

* Half time during July and August
** Without pay
*** Since June 28